



MTO

Composite  
CAD

**Organization(s):** Microcosm Tech; PEBiosystems; and Stanford University

**Title:** Netflow – CAD for Chemical Transport in Micro-Fabricated Fluid Interconnects

**Duration of Effort:** August 1996 - August 1999

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### Objective

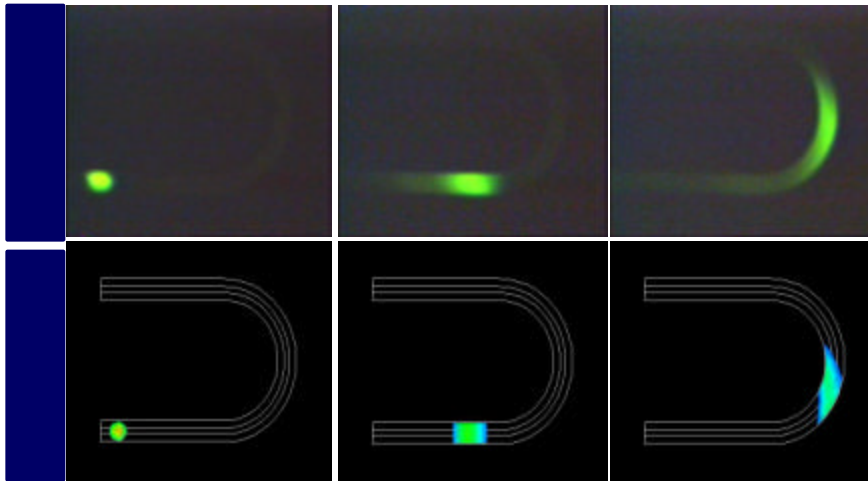
This project aims at developing the capability to design micro-fabricated interconnects for chemical transport in microfluidic devices. The program includes the development of tools for interconnect layout and model construction as well as tools for detailed numerical analysis. Experimental measurements are an integral part of the program to provide validation data for the simulations.

### Progress/Results

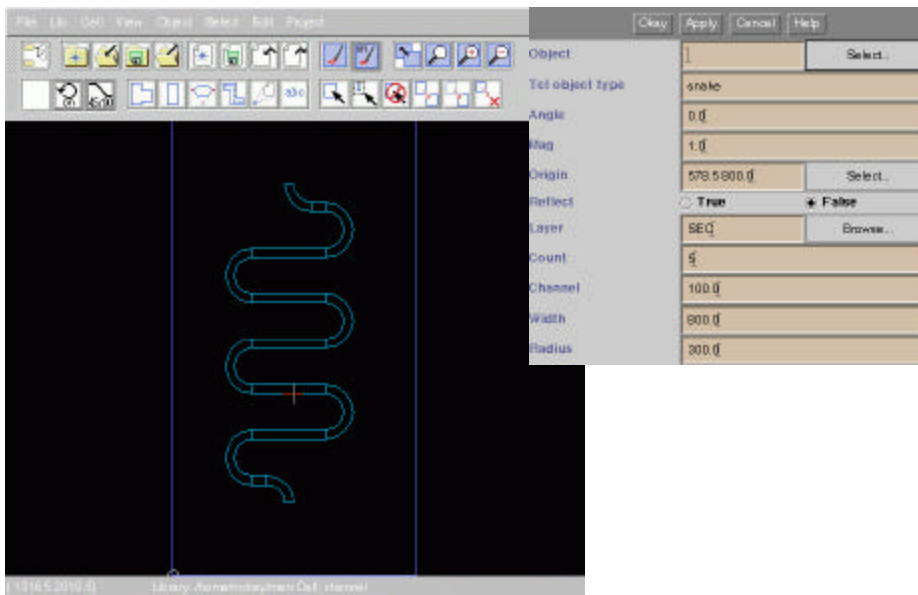
- Commercial versions of NetFlow-C and T are available. New releases are scheduled at regular intervals. NetFlow-G is planned for release in Q4 1999.
- Additional task on pneumatic plug flow included in NetFlow and completed in Q3 1999.
- Developed methodology for extraction of material property information (diffusion constants, electrokinetic mobilities etc.) from coupled experimental/analytical method. Demonstrated by applying to electrophoretic flow in serpentine geometries.
- Incorporation of relevant physics such as non-dilute charge distribution, temperature cycling effects etc.
- Development of a generator-based tool to lay out channel designs and to provide a mechanism to transfer information with solid modelers. Incorporated the ability to interface with all common layout formats.
- Papers published at Hilton Head, MSM, ASME, Transducers, etc.

### Status

- All Program Milestones have been met. The NetFlow software is in commercial release. New releases are planned at regular intervals in the next two years. Tasks added to the original schedule (pneumatic transport and high salt transport) have also been completed and delivered.
  - NetFlow is installed at PE Biosystems, Stanford, and at AFRL. Training was conducted for researchers in both organizations. NetFlow is in use in design analyses in PE and at Stanford.
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## Experiment and Simulation of Electrophoretic Flow in Serpentine Microchannels using NetFlow-T



Fluidic Element  
generator in  
NetFlow -G

Thermocapillary plug flow. NetFlow-T has been extended to handle pneumatic and thermal driven plug flows.

